

WHAT IS CLAIMED IS:

1. A flat display device comprising:

a first polarization plate having a polarization axis and adapted to transmit linearly polarized light
5 along the polarization axis;

an optical modulation layer located behind the first polarization plate to modulate incident light in accordance with an applied voltage;

10 a selective reflecting layer located behind the optical modulation layer to selectively reflect a first circularly polarized light component of the incident light; and

15 a backlight located behind the selective reflecting layer to output light having intensity peaks in a plurality of predetermined wavelengths,

wherein the selective reflecting layer transmits, of the first circularly polarized light component, substantially all of light components having wavelengths in a plurality of small regions including the respective predetermined wavelengths, and reflects substantially all of a light component in regions between the plurality of small regions.
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25 2. An apparatus according to claim 1, wherein the selective reflecting layer is formed of a polymerized cholesteric liquid crystal layer, the cholesteric liquid crystal layer has a helical structure wherein of the first circularly polarized light component, light

components in the plurality of small regions including
the respective predetermined wavelengths are
substantially entirely transmitted, and light
components in regions between the plurality of small
regions are substantially entirely reflected.

5 3. An apparatus according to claim 1, wherein the
plurality of small regions include wavelengths of
430 nm, 550 nm, and 610 nm, respectively.

10 4. An apparatus according to claim 3, wherein
each of the plurality of small regions has a width of
20 to 30 nm.

15 5. A liquid crystal display device comprising:
an optical modulation layer which is sandwiched
between a pair of observation-side and
back-surface-side transparent substrates opposing each
other and has a plurality of liquid crystal pixels
arranged in a matrix, for modulating incident light in
accordance with an applied voltage;

20 a selective reflecting layer having a plurality of
selective reflecting filters arrayed in a predetermined
cycle, respectively, on back-surface sides of the
liquid crystal pixels to selectively and partially
reflect light components having different wavelength
bands; and

25 a color filter layer having a plurality of color
filters disposed to oppose front-surface sides of the
selective reflecting filters and arranged such that

a peak wavelength of spectral characteristics in a visible light range of each of the color filters falls within a reflection wavelength band of a corresponding one of the selective reflecting filters.

5 6. An apparatus according to claim 5, wherein the color filter layer is formed on an inner surface of the observation-side transparent substrate.

10 7. An apparatus according to claim 5, wherein the selective reflecting layer is arranged between the optical modulation layer and the back-surface-side transparent substrate.

15 8. An apparatus according to claim 5, wherein the plurality of selective reflecting filters are made of cholesteric liquid crystal layers, respectively.

20 9. An apparatus according to claim 8, wherein an average value of helical pitches of the cholesteric liquid crystal layers changes between adjacent ones of the selective reflecting filters.

25 10. An apparatus according to claim 5, wherein each of the selective reflecting filters and color filters has a shape of a stripe extending along an array of the liquid crystal pixels.

25 11. An apparatus according to claim 5, wherein each of the selective reflecting filters has a reflection wavelength band partially overlapping that of either adjacent one of the selective reflecting filters.

12. An apparatus according to claim 5, further comprising a surface light source arranged on a back-surface side of the selective reflecting layer.

13. A liquid crystal display device comprising:

5 an optical modulation layer which is sandwiched between a pair of observation-side and back-surface-side transparent substrates opposing each other and has a plurality of liquid crystal pixels arranged in a matrix, for modulating incident light in accordance
10 with an applied voltage;

15 a selective reflecting layer having a plurality of selective reflecting filters arrayed in a predetermined cycle, respectively, on back-surface sides of the liquid crystal pixels to selectively and partially reflect light components having different wavelength bands; and

20 a color filter layer having a plurality of color filters disposed to oppose front-surface sides of the selective reflecting filters and having different transmission wavelength ranges in a visible light range,

25 wherein each color filter has a wavelength range in which a transmittance in the visible light range is not less than 50% and a wavelength range in which a transmittance in the visible light range is less than 50%, and

each of the selective reflecting filters has a

reflectance of 50% to 90% for light in the wavelength range in which a transmittance of a corresponding one of the color filters opposing the selective reflecting filter is not less than 50%, and has a reflectance of more than 90% for light in the wavelength range in which a transmittance of the corresponding color filter is less than 50%.

14. A device according to claim 13, wherein the color filter layer is formed on an inner surface of the observation-side transparent substrate.

15. A device according to claim 13, wherein the selective reflecting layer is formed between the optical modulation layer and the back-surface-side transparent substrate.

16. A device according to claim 13, wherein the plurality of selective reflecting filters are formed from cholesteric liquid crystal layers, respectively.

17. A device according to claim 16, wherein the cholesteric liquid crystal layers have a structure in which a plurality of layers having different helical pitches are stacked in a direction of thickness, and adjacent ones of the selective reflecting filters have different helical pitches.

18. A device according to claim 13, wherein each of the selective reflecting filters and each of the color filters have a shape of a stripe extending along an array of the liquid crystal pixels.

19. A device according to claim 13, wherein each
of the selective reflecting filters has a wavelength
band partially overlapping a wavelength band of any one
adjacent selective reflecting filter of the selective
reflecting filters for light in a wavelength band in
which the transmittance is not less than 50%.
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20. A device according to claim 13, further
comprising a surface light source disposed on a
back-surface side of the selective reflecting layer.
- 10 21. A device according to claim 13, wherein a
square value of a Y value of an average transmittance
of the color filter layer is not less than 40%.